NOTES ON AUSTRALIAN CESTODES

BY

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V. THREE CESTODES FROM THE BLACK SWAN

The three following species of Cestodes were found in the intestine of *Chenopsis atrata*, Lath. (the Black Swan), several of which were examined at Townsville, North Queensland:—

(1) *Nematoparataenia paradoxa*, n. g., n. sp.
(2) *Echinorhynchotaenia nana*, n. sp.
(3) *Hymenolepis lanceolata* (Bloch, 1782), Weinland, 1858.

(1) *Nematoparataenia paradoxa*, n. g., n. sp.

On a single occasion about twenty specimens of this worm were obtained.

External Anatomy.

The worm measures about 9 mm. in length and 4 mm. in breadth except at the posterior extremity, where it expands into an oval saccular portion measuring about 0·8 mm. in length by 0·6 mm. in breadth.

The cuticle exhibits no trace of segmentation, even under high magnification. In cross-section the worm is circular with a ventral indentation (figs. 3 and 4).

Head. The head is armed with four suckers measuring 80μ to 100μ in diameter. They are borne on short pedicles about 100μ long, which are situated about 200μ from the anterior extremity. The anterior end of the head is occupied by a wide cup-shaped cavity about 400μ deep, bearing round its margin twelve flattened tentacular processes with minute spines about 2μ long closely arranged around their borders. These tentacles are similar to those seen in the various species of the genus *Parataenia*, Linton; they

measure about 120μ long and 40μ broad. There is a well marked neck about 300μ in length, which narrows to about 300μ in

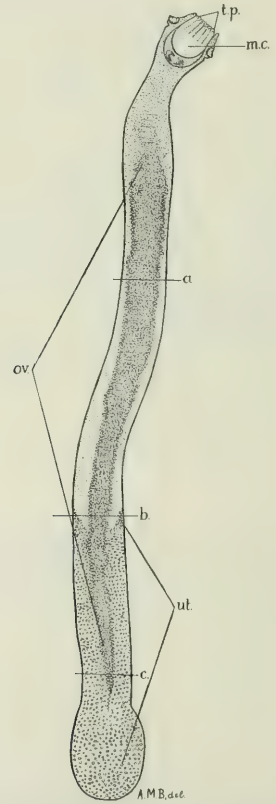

Fig. 1. *Nematoparataenia paradoxa*, n.g., n.sp. Complete worm. *a*—position of fig. 2; *b*—position of fig. 3; *c*—position of fig. 4; *m.c*—mouth cavity; *ov*—ovary; *t.p*—tentacular processes; *ut*—uterus. × 17.

diameter. The remainder of the worm is cylindrical with a longitudinal groove running along its ventral surface (fig. 1).

INTERNAL ANATOMY.

Muscular system. This consists of a series of separate longitudinal fibres arranged in an irregular double row immediately beneath the cuticle. No transverse or dorso-ventral fibres were seen (figs. 2 and 3).

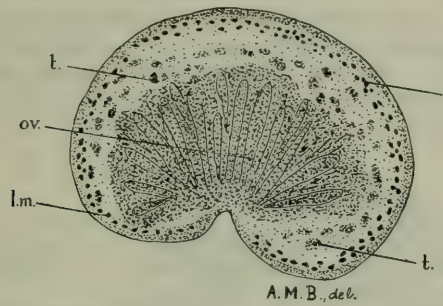

FIG. 2. *Nematoparataenia paradoxa* n.g., n.sp. Transverse section at *a*—fig. 1; *l.m.*—longitudinal muscle fibres; *ov*—ovary; *t*—testes. × 140.

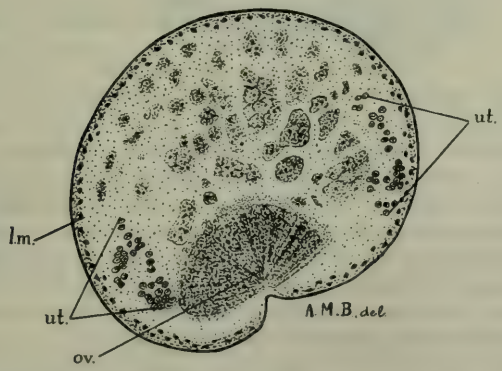

FIG. 3. *Nematoparataenia paradoxa* n.g., n.sp. Transverse section at *b*—fig. 1; *l.m.*—longitudinal muscle; *ov*—ovary; *ut*—uterus. × 140.

Nervous and excretory systems. No details of these could be made out.

Genitalia.

Testes. The testes are small and extremely numerous, they lie in the dorsal and lateral fields (fig. 2); towards the middle of the worm they begin to become fewer in number.

Vas deferens. No vas deferens, cirrus, or genital pore was seen.

Ovary. The ovary is situated ventrally and occupies the middle threequarters of the worm's length. In whole mounts the ovary shows no trace of segmentation, except that the lateral margins are serrated (fig. 1); in cross-section it is fan-shaped, the lobes radiating dorsally and laterally from a central point opposite the ventral groove; towards the posterior it gradually atrophies.

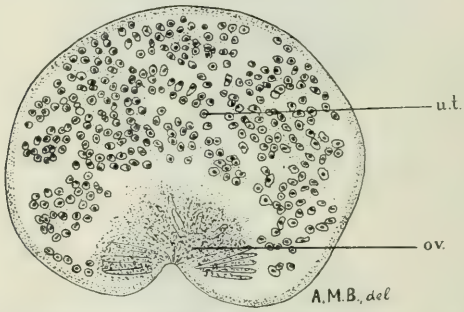

FIG. 4. *Nematoparataenia paradoxa* n.g., n.sp. Transverse section at *c*—fig. 1; *ov*—ovary; *ut*—uterus. × 140.

Vagina and receptaculum. These structures were not seen.

Uterus. The uterus begins about the junction of the middle and posterior thirds of the worm. It first appears at each side close under the cuticle, and as the ovary atrophies the two lateral limbs of the uterus gradually increase in size until they unite, and finally it occupies the whole of the body.

Eggs. The eggs are circular and measure about 10μ in diameter; further details could not be determined.

DIAGNOSIS.

This worm resembles *Parataenia medusia*, Linton (1890), only in its possession of tentacular processes on the head. It also bears a superficial resemblance to *Nematotaenia dispar*, Lühe (1899) in being unsegmented. Apart from these slight resemblances to the

above two species, this worm has characters entirely different from any known worm; this necessitates its being placed in a new genus, which we have named *Nematoparataenia*, and of which the following is the definition:—

Nematoparataenia, n.g.

Cylindrical worms with four suckers, and a number of digitate processes on the head. No trace of internal or external segmentation.* Type species *Nematoparataenia paradoxa.*

The type species is in the Museum of the Liverpool School of Tropical Medicine.

(2) *Echinorhynchotaenia nana*, n. sp.

About twenty specimens of this worm were obtained. Unfortunately the material was in very poor condition, so a full description is not possible.

External Anatomy.

The largest worm measured about 2 cm. in length and including the cuticular expansions, which occur on the posterior borders of the segments, 1·7 mm. in breadth; the breadth of the worm without these expansions is about 1·3 mm.

Head. The head is about 1·5 mm. broad and 2·3 mm. long. Viewed anteriorly it is square, with rounded corners; each corner is occupied by a very strongly developed sucker looking almost directly forwards, and with a diameter of about 450μ. In the centre of the anterior surface there is a small pit. When viewed from the side, the anterior surface is bluntly rounded, and the central pit, which is almost 300μ deep, is seen to lie anterior to the suckers. Behind each sucker is a lappet, as in *Anoplocephala perfoliata* (Goeze, 1782), Blanchard, 1848. Behind the lappets the the head narrows gradually to a width of about 600μ, at which point it is sharply marked off from the narrower anterior segments, which it tends to overlap, by a cuticular collar-like ring. There is no neck (fig. 5).

* Although we were unable to see definite signs of segmentation, it should be noted that all our specimens were fully gravid and, therefore, old, and it is quite possible that in younger worms there would be segmentation in the internal organs.

Segments. The segments are broader than long, the most fully developed being 2 mm. broad and 200μ long. They are like a number of saucers placed one within the other with the concavity facing posteriorly. This appearance is caused by the whole circumference of the posterior borders of the segments being provided with cuticular expansions about three times as long as the segments themselves. In cross-section the segments of the anterior two-thirds of the worm are nearly circular, whilst those of the posterior third are oval. The genital pores are unilateral and open on the right side.

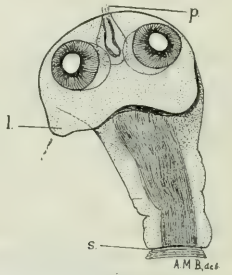

FIG. 5. *Echinorhynchotaenia nana*, n.sp. Scolex. *l*—lappet; *p*—fragment of proboscis; *s*—beginning of strobila. × 17.

INTERNAL ANATOMY.

Muscular system. The longitudinal muscle is disposed in two layers, an outer feebly developed layer consisting of a few small bundles, and a relatively enormously developed inner layer measuring 300μ in thickness (fig. 6). External to these are a few transverse fibres. No dorso-ventral fibres were seen. Four strands from the internal longitudinal layer run one to each sucker; the latter organs are extremely muscular, and in some specimens had actually fallen out of the scolex and appeared as almost spherical solid bodies.

Nervous system. There is a single lateral nerve on each side of the body lying external to the excretory vessels.

Excretory system. A number of excretory tubes can be seen in the head, and these unite to form two lateral vessels on each side. The two lateral vessels are of about the same diameter, and one lies directly dorsal of the other.

Genitalia.

Testes. The testes are three in number and they lie behind the ovary in the same transverse plane, two being on the aporal side. In full development they measure about 60μ in diameter.

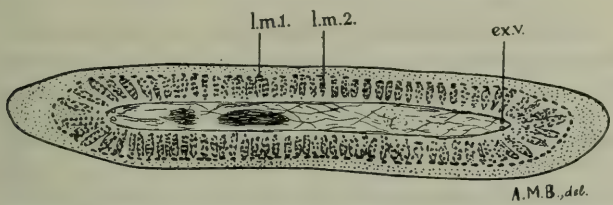

Fig. 6. *Echinorbynchotaenia nana*, n.sp. Transverse section towards posterior part of worm. *ex.v.*—excretory vessels; *l.m.*1.—outer longitudinal muscle layer; *l.m.*2.—inner longitudinal muscle layer. × 70.

Vas deferens. The vas deferens expands into a fairly large vesicula seminalis lying anterior to the mesial end of the cirrus pouch and connecting with the latter organ by a narrow duct. The cirrus pouch is 500μ long and 80μ broad, extending almost half-way across the segment. The cirrus is as long as its pouch and ends in a club-shaped extremity, the extreme end of which is surrounded by a small sphincter muscle. The external surface of the cirrus is closely

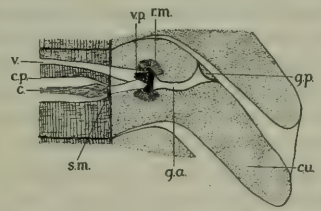

Fig. 7. *Echinorbynchotaenia nana*, n.sp. Termination of sex ducts. *c*—cirrus; *c.p.*—cirrus pouch; *cu*—cuticle; *g.a.*—genital atrium; *g.p.*—genital pore; *r.m.*—retractor muscle; *s.m.*—sphincter muscle at tip of cirrus; *v.*—vagina; *v.p.*—vaginal plug. × 40.

covered with minute spines. From the lateral border of the segment the male duct extends into the cuticle as a thin-walled tube, and it ends at its junction with the vagina which occurs about the centre of the cuticular expansion. From this junction the genital atrium runs laterally to open on the anterior surface of the cuticular prolongation about the junction of its inner and middle thirds (fig. 7).

Ovary. The material was in such a bad state of preservation that details relating to the ovary and vitelline glands could not be made out. The ovary is centrally situated in front of the testes, and all that could be seen was a number of acini, each measuring about 30μ in diameter.

Vagina and receptaculum. The vagina opens into the genital atrium immediately ventral to the male pore, and lying in its open end is a solid conical plug with a broad base (fig. 3). This plug is inserted into the slightly funnel-shaped opening of the vagina, and around the opening is a strongly developed muscle, which from the radial arrangement of its fibres probably acts as a retractor, drawing the walls of the vagina away from the plug. From the pore the vagina passes inwards anterior to the cirrus pouch, narrowing slowly until just internal to the excretory vessels it expands into a club-shaped receptaculum seminis, which runs as far as the median plane.

Uterus. The uterus is a simple transverse sac loosely packed with eggs.

Eggs. The eggs are circular and measure 40μ in diameter, and the oncosphere measures 32μ.

DIAGNOSIS.

Führmann (1909) erected the genus *Echinorhynchotaenia* to accommodate a species which possessed a proboscis-like rostellum armed with spines. Our worm closely resembles Führmann's species in its general anatomy except that the characteristic proboscis had been apparently torn out in all our specimens, but the appearance of the head, with a few ragged fibres protruding from the central pit, leaves no room for doubt that a proboscis has been present. The points in which our species differs from Führmann's *E. tritesticulata* are the following: —

	E. tritesticulata	*E. nana*, n.sp.
Length	30 cm.	2 cm.
Breadth	4–5 mm.	1·7 mm.
Lappets	absent	present
Apparatus at vaginal pore	absent	present
Genital atrium	absent	present
Position of genital pore	On anterior of lateral border of segment.	On anterior surface of cuticular expansion

We, therefore, consider ours a new species, and name it *Echinorhynchotaenia nana*.

The type specimen is in the Museum of the Liverpool School of Tropical Medicine.

(3) *Hymenolepis lanceolata* (Bloch, 1782), Weinland, 1858.

This cestode was found on four occasions. Many hundreds of specimens were obtained, and as they showed a wide variation in size and development, it is proposed to discuss these variations, since apparently they have not been noted in previous descriptions of the species.

The largest specimen was 55 mm. in length with a maximum breadth of 5 mm., and from these dimensions there were worms of every gradation in size down to specimens only 11 mm. in length by 0·3 mm. in breadth; that this difference in size is not altogether due to different ages of the specimens is shown by the fact that many of the smallest worms had a fully gravid uterus in their posterior segments.

Some of the smaller worms have only a part of the genitalia present. That is, either the male or female organs may be completely absent, but in no case was a worm seen in which both sets of glands were absent. In some without testes the uterus contains eggs; probably this is brought about by cross-copulation between different individuals. It may be held that the testes were originally present and have atrophied, but this is unlikely, as in the larger normal worms testes and ovaries are present together in all of the mature segments. In these small varieties the muscular system is poorly developed, with the result that the worms are very thin and diaphanous when compared with the larger ones. Another abnormality which was frequently observed was that the segments immediately behind the scolex rapidly increased in breadth in the normal manner, but after about the twentieth segment, instead of continuing to increase they became successively narrower for about a similar number of segments, after which the usual gradual and continuous increase took place.

At first glance it would appear that worms of different species were included under the one head, but that this is not the case is shown by the following points:—

(1) The scolex and the few segments immediately following it are the same in all cases.

(2) The cirrus, when present, is always of the same relative length and shape, no matter what the size of the worm.

(3) The male and female genitalia occupy the same relative positions in the segments, whether present complete or only in part.

(4) When a long series of material is examined, a regular sequence from the largest to the smallest worms can be obtained.

As normally developed worms departed in no particular from previous descriptions of the species *H. lanceolata*, detailed anatomy has not been given.

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